

### Office Action Summary

**Application No.**

10/537,643

**Applicant(s)**

MIN ET AL.

**Examiner**

Renee Danega

**Art Unit**

4111

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 10-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 20-25 is/are allowed.
- 6) ☒ Claim(s) 10, 11, 18 and 19 is/are rejected.
- 7) ☒ Claim(s) 12-17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date 04/24/2006
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 13 and 14 are objected to as it is unclear what the "other" signal is referring to in claim 10. Claim 17 is objected to as it is unclear what the "first" signal is referring to in claim 10. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ezenwa et al. (US 5063937) in view of Weggel (US 6320370). Ezenwa teaches a method for measuring an electrical impedance of an object using periodic non sine wave signals as claimed by applicant including applying an excitation signal to the object and measuring a response to the excitation signal using synchronous demodulation. A reference signal drives the synchronous detector. The signals are square waves/rectangular waves with constant value sections (see columns 2, 4, and 5). Ezenwa et al do not teach shortening the signals constant value sections by a predetermined first interval. Weggel teaches a method for measuring current through an object/load by pulse width modulation of signals, which varies the width of a train of

square waves (column 5, lines 6-10). It would have been obvious in view of Weggel to shorten one of the signals by a first time interval for better accuracy of signals and impedance measurement.

- Regarding claim 13, the other signal can be further modified by a predetermined time interval using Weggel's method in the same manner as stated with regards to the signal shortened in claim 10 above in order to improve accuracy and impedance measurement.

4. Claims 11, and 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ezenwa and Weggel as applied to claim 10 above, and further in view of Eek et al. (Electrical Bio-Impedance Measurement in a Rate-Adaptive Pacemaker). Ezenwa and Weggel don't teach shortening signals over a first time interval to suppress the 3<sup>rd</sup> harmonic. Eek et al. teaches a method of measuring impedance having the method step of suppressing signal harmonics interfering with accurate signals (see page 2). It would have been obvious in view of Eek et al. to select a predetermined first time interval to suppress the 3<sup>rd</sup> harmonic in order to be able to separate and identify the signal components in bioimpedance measuring in the method of Ezenwa as modified by Weggel.

- Regarding claims 12, 15, and 16, Eek et al. would meet the respective time intervals to suppress unwanted harmonics.
- Regarding claims 14 and 17, taking the signals to zero during a specific time inherently eliminates the signals at those times. It would have been

obvious in view of Eek et al. to take the respective signals to zero during unwanted harmonics to enhance the accuracy of impedance measurement in the method of Ezenwa as modified by Weggel.

5. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minn et al. (An Implantable Analyzer of Bio-Impedance Dynamics: Mixed Signal Approach) in view of Weggel (US 6320370). Minn teaches an excitation current source, taken to be a first generator, a reference frequency synthesizer taken to be a second generator, and a synchronous demodulation channel, which receives the response signal from the excitation signal passed through a bio-object and has a reference input for the reference signal which is taken to be the synchronous detector. Minn doesn't teach that the excitation and reference waves have constant values and are shortened by differing intervals for each half period to suppress harmonics. However, Weggel teaches a circuit for measuring current flowing through a load drive by pulse width modulation (PWM). One having ordinary skill in the art would know that PWM involves varying the width of a train of square waves. Weggel teaches control signals taken to function as reference signals, which have pulse widths shorter than those of which are generated to drive the entire system (column 5, lines 6-10, claim 11). It would be obvious to one having ordinary skill in the art in view of Weggel to take the signals to values of zero during the predetermined time intervals because PWM is done to eliminate harmonics, which create noise and measurement error. It would have been obvious to use the signals taught by Weggel in Minn's system to shorten the generated signals to accurately measure bio-impedance.

- Regarding claim 19, Minn teaches that the reference signal is compared in both sine and cosine forms, one of them being in quadrature or shifted 90 degrees (figure 1, MQ) with the excitation signal.

***Allowable Subject Matter***

6. Claims 20-25 are allowed. The examiner was unable to find in phase and quadrature channels with inputs connected to auxiliary and bipolar signals capable of generating a shortened pulse in the references. Claims 21-25 are allowed, as they are dependent on claim 20.
7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kinast (US 6377845) teaches an impedance measuring method and device in which a synchronous demodulator is used to reject interfering signals not harmonically related to the measurement frequency driven by a square wave/rectangular wave reference voltage.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renee Danega whose telephone number is (571) 270-3639. The examiner can normally be reached on Monday through Thursday 7:30-5:00 eastern time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sam Yao can be reached on (517) 272-1224. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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